



Texaco

November 6, 1986

TO: File

FROM: G. A. Turl

SUBJECT: Formation Fluid Sampling From WD-1
(Santa Margarita) - October 16, 1986

Based upon statements from Messrs. Clark Brannin (Texaco Drilling Engineer) and Alan Spencer (Texaco Environmental Technician), the following is pertinent information relative to the events leading to the subject sampling and analysis:

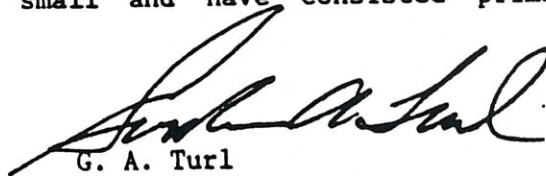
1. On October 15, 1986, cement was drilled out (inside the 8-5/8" casing) to 5170', and the inside of the casing was scraped clean.
2. The fluid level inside the casing was removed from inside the casing so that the top of the water column was at 1900' below ground level. This insured perforation would be 'underbalanced'. That is, the pressure inside the casing was less than the formation pressure. This is desirable so that when the perforations are shot, fluid flows from the perforations into the casing (thus cleaning the perforations).
3. The casing was perforated with four, 1/2" holes per foot from 4875' to 5075'.
4. When the last gun was run into the hole (to shoot the top 20', ie from 4895' to 4875') the fluid level was approximately 460'. Therefore, the fluid level had risen from 1900' to 460'. This volume of water (3686 gallons) was all formation water.
5. On October 16, 1986, at 5:30 P.M., eight water samples were taken from the well. Pool Well Service Co. (contractor) retrieved the fluid from the zone. Samples taken were placed in the following containers by Texaco's Environmental Technician accorded to accepted procedures:

- 4	VOA's, EPA 624	
- 1	500 ml/plastic	CAM Metals
- 1	500 ml/plastic	Chloride, Sulfate, TDS
- 1	Quart/glass	Oil, Grease
- 1	Quart/glass	EPA 625

The first time the bailer was brought up it was empty, apparently due to a malfunction. On the second try, the bailer was brought to surface and it contained water. After bailer was brought to surface, the contractor had to unplug the end of the bailer because it was packed with sand. Finally, the bailer was unplugged and the water sample from bailer was put into a cut off five gallon plastic drinking water container.

From this container, the eight sample bottles were filled. The water had a slight hydrocarbon odor, blackish grey in color with a brown foamy type appearance of oil floating on top.

Based upon these procedures, the water samples taken were definitely felt to represent Santa Margarita formation water at this location. Any contamination would have been small and have consisted primarily of bentonite clay and fresh water.



G. A. Turl

GAT/nrb
193/86



1001 GALAXY WAY
SUITE 107
CONCORD, CA 94520
PHONE (415) 682-7960

24 November 1986

Mr. Gordon Turl
Texaco Refining and Marketing, Inc.
6451 Rosedale Highway
Bakersfield, CA 93302

Dear Gordon:

Please find attached the backup from our laboratory regarding the analytical methodology used for the injection well samples. As we discussed, the samples were analyzed in the emulsion form (2 phase oil and water).

We hope this information is useful to you. Please do not hesitate to call should further clarification be needed. Thanks again for your interest and we hope WESTON can continue to support your efforts at the Bakersfield Refinery.

Sincerely,

ROY F. WESTON, INC.

Lynne M. Preslo
Project Manger, Hydrogeologist

LMP:ed

Attachment

Inter-Office Memorandum



TO: Lynne Preslo

FROM: David Ben-Hur

DATE: November 24, 1986

PROJECT: Texaco

LAB NO. 86-10-047

SUBJECT: Injection Zone Samples

ACTION:

In preparing the samples for analysis, the following methods have been used:

- a. Hazardous substances list - organic.
 1. Volatiles - EPA Method 5030. The sample was taken "as is" (oil and water phases). Because the sample was high in hydrocarbons, it required a 1:10 dilution.
 2. Semivolatiles - EPA Method 3510, separatory funnel liquid-liquid extraction. The sample was taken "as is" for extraction. The extract resulted in solvent, emulsion and water phases. The resulting emulsion was centrifuged and the solvent portion was combined with the previous solvent extract and analyzed.
- b. Metals (B, Ba, Cd, Sb, Be, Co, Mo, Tl, Zn, Cr, Pb, Fe, Ag, Ca, Mg, Na, K, Mu, Cu, Ni, V, Sr) - EPA Method 3020, nitric acid digestion.
- c. Mercury - EPA Method 245.1, Cold Vapor.
- d. Arsenic - EPA Method 206.3, Hydride.
- e. Selenium - EPA Method 270.3, Hydride.

All other parameters were analyzed in accordance with the methods specified in "Methods for Chemical Analysis of Water and Wastes," EPA-600/4-79-020.

Formation Fluid Analysis
Red Ribbon WD - 1

Samples of formation fluid were taken on January 26, 1989, during re-perforation of Red Ribbon WD-1. Samples were analysed as shown on the attachment.

In order to sample with minimum contribution from previously injected water it was necessary to set a bridge plug above the existing perforated interval. The casing was perforated and several well volumes were removed from the well by swabbing.

Samples were taken by two methods:

Inorganics & EPA 8270: Samples were taken at the well head after removal of several well volumes by swabbing.

EPA 8240: Samples for volatiles were taken with a "Wofford" sampler. This device maintains sample integrity by preventing out-gassing of volatiles. Two sets of samples were analyzed; the first set was taken from the Wofford sampler at the well head, the second set was sent to Core Labs in Dallas. Core labs uses a method to sample from a Wofford sampler that allows for the analysis of any off-gases. The sample did not have sufficient gas to quantify the Benzene and Toluene concentrations. Sample vials were prepared at Core Labs and returned to the Laboratories shown in the attachment.

Formation Fluid Analysis

Red Ribbon WD-1

BC Labs

Enseco

Metals

Units

Sb	mg/kg	< 3.5	< 0.1
As	mg/kg	< 0.35	0.008
Ba	mg/kg	0.93	0.17
Be	mg/kg	< 0.35	< 0.01
Cd	mg/kg	< 0.35	< 0.01
Cr	mg/kg	0.62	0.26
Co	mg/kg	< 1.75	< 0.02
Cu	mg/kg	3.69	0.92
Pb	mg/kg	1.97	0.68
Hg	mg/kg	< 0.07	0.002
Mo	mg/kg	< 1.75	0.04
Ni	mg/kg	< 1.75	0.12
Se	mg/kg	< 0.35	< 0.01
Ag	mg/kg	< 0.35	< 0.02
Th	mg/kg	< 3.5	< 0.1
V	mg/kg	< 0.35	< 0.02
Z	mg/kg	5.01	1.1

General Minerals

Ca	mg/l	188	123
Mg	mg/l	14	78
Na	mg/l	670	685
F	mg/l		< 0.1
K	mg/l	16	20
Cl	mg/l	1765	1600
SO4	mg/l	1200	1100
Fe	mg/l	40.1	44
Mn	mg/l	1.5	1.4
TDS	mg/l	2770	3020
Phenols	mg/l	5.4	6.4
TSS	mg/kg	756	300
Sulfide	mg/l	250	133
TOC	mg/l	185	279
Ammonia-N	mg/l	740	820
Cond.	umhos/cm	9400	8400
pH		8.5	8.53

Formation Fluid Analysis

Red Ribbon WD-1

BC Labs

Enseco

Zalco

Core Labs

EPA 8270

		BC Labs	Enseco	Zalco
2,4-DMP	ug/l	453	< 50	730
Phenol	ug/l	34 (1)	750	820
2-mPhenol	ug/l	253 (1)	230	1600
4-mPhenol	ug/l	138 (1)	430	2200
Benzoic Acid	ug/l	(2)	7900 (4)	(2)
Naphthalene	ug/l	70 (1)	110	140
2-mNaphthalene	ug/l	151 (1)	73	100

EPA 8240 - "Wofford" sampler

		BC Labs	Enseco	Zalco
Benzene	ug/l	1493	7300	10500
E-Benzene	ug/l	3820	6100	6600
Toluene	ug/l	3168	7300	4600
o-Xylene	ug/l	67400	31000 (3)	22300 (3)
p-Xylene	ug/l	10300		
m-Xylene	ug/l	6430		

EPA 8240 - "Wofford" sampler, prepared by Core Labs

		BC Labs	Enseco	Core Labs
Acetone	ug/l		3000	11000
Benzene	ug/l	735	9200	7000
E-Benzene	ug/l	5280	4500	8700
Toluene	ug/l	1641	7500	29000
o-Xylene	ug/l	59000	22000 (3)	
p-Xylene	ug/l	8090		
m-Xylene	ug/l	5280		3200
1,1,1-TCE	ug/l	910	3000	

Notes:

- (1) - Possible error in calibration
- (2) - Not Reported
- (3) - Total Xylenes
- (4) - Estimate Value Only, outside calibration range



CC: RL

Overnight Mail

November 6, 1986

Mr. Sheldon Gray
California Regional Water Quality
Control Board
3614 E. Ashlan Avenue
Fresno, CA 93726

Dear Mr. Gray:

Enclosed please find some additional analytical data which provides an indication of the level of contamination that exists in the groundwater in the vicinity of where Texaco Refining and Marketing Inc. proposed to construct its wastewater injection well. This data was recently obtained with the objective to investigate the volatile organic content that exists in the formation fluid of the nearby petroleum producing formations.

Table I summarizes the main parameters of concern. Of primary interest is the relative high concentrations associated with the formation fluid obtained from the well in the Santa Margarita formation which is perforated at 4875'-5075'. The benzene, toluene, xylene (BTX) concentrations indicated are sufficiently high to assure that the wastewater to be injected would not degrade the formation fluid which currently exists.

It is hopeful that this additional information will provide you further technical information in preparing waste discharge requirements for TRMI's wastewater disposal wells. Please contact Gordon A. Turl, 805/326-4265, to coordinate any further needs.

Very truly yours,

L. E. Perrier

GAT/nrb
194/86

Enclosure

cc: LRL, Bakersfield District (w/attachments)
TLG-RL (w/o attachments)
GAT-THJ-JJS (w/o attachments)
File 34040-0-A-25-X-400

COMPL. FILE NO. 111-1111
SEE ANAL. IS. SHEETS FOR FULL ANAL. & DETAILS

FRUITVILLE GOLF
COURSE VICINITY

OMATION FLUID DATA
MI/BACHENSFELD PLANT

PRELIMINARY

WELL DESIGNATION: 33-4 CHANAC 3575THRU-149 33-4 CHANAC 3300THRU-325 33-4 CHANAC 3872THRU-3890 33-4 CHANAC 4036THRU-3956 33-4 CHANAC 4073THRU-3988 33-4 CHANAC 4212THRU-4242 33-4 CHANAC 4268THRU-4298 33-4 CHANAC 4130THRU-4110 33-4 CHANAC 4255THRU-4265 33-4 CHANAC 4275THRU-4295

FORMATION NAME: CHANAC 3575THRU-149 33-4 CHANAC 3300THRU-325 33-4 CHANAC 3872THRU-3890 33-4 CHANAC 4036THRU-3956 33-4 CHANAC 4073THRU-3988 33-4 CHANAC 4212THRU-4242 33-4 CHANAC 4268THRU-4298 33-4 CHANAC 4130THRU-4110 33-4 CHANAC 4255THRU-4265 33-4 CHANAC 4275THRU-4295

PERFORATION DEPTH: 3575THRU-149 33-4 CHANAC 3300THRU-325 33-4 CHANAC 3872THRU-3890 33-4 CHANAC 4036THRU-3956 33-4 CHANAC 4073THRU-3988 33-4 CHANAC 4212THRU-4242 33-4 CHANAC 4268THRU-4298 33-4 CHANAC 4130THRU-4110 33-4 CHANAC 4255THRU-4265 33-4 CHANAC 4275THRU-4295

FEET: 3575THRU-149 33-4 CHANAC 3300THRU-325 33-4 CHANAC 3872THRU-3890 33-4 CHANAC 4036THRU-3956 33-4 CHANAC 4073THRU-3988 33-4 CHANAC 4212THRU-4242 33-4 CHANAC 4268THRU-4298 33-4 CHANAC 4130THRU-4110 33-4 CHANAC 4255THRU-4265 33-4 CHANAC 4275THRU-4295

ANALYSIS DATE: AUG-24-74 AUG-24-74 AUG-24-74

SPECIFIC CONDUCTANCE (UMHOS): 18170 6300 3000 534 7

TOTAL DISSOLVED SOLIDS (MG/L): 18170 6300 3000 534 7

CHLORIDE (MG/L): 18170 6300 3000 534 7

OIL AND GREASE (MG/L): 18170 6300 3000 534 7

SULFATE (MG/L): 18170 6300 3000 534 7

BENZENE (UG/L): 18170 6300 3000 534 7

TOLUENE (UG/L): 18170 6300 3000 534 7

ETHYLBENZENE (UG/L): 18170 6300 3000 534 7

STYRENE (UG/L): 18170 6300 3000 534 7

XYLENES (UG/L): 18170 6300 3000 534 7

NAPHTHALENE (UG/L): 18170 6300 3000 534 7

PHENOLS (UG/L): 18170 6300 3000 534 7

BENZOIC ACID (UG/L): 18170 6300 3000 534 7

UNO (): UNDETECTED (DETECTION LIMIT)

ANALYSIS DATE: SEP-21-76 SEP-21-76 SEP-21-76

FORMATION NAME: CHANAC 3575THRU-149 33-4 CHANAC 3300THRU-325 33-4 CHANAC 3872THRU-3890 33-4 CHANAC 4036THRU-3956 33-4 CHANAC 4073THRU-3988 33-4 CHANAC 4212THRU-4242 33-4 CHANAC 4268THRU-4298 33-4 CHANAC 4130THRU-4110 33-4 CHANAC 4255THRU-4265 33-4 CHANAC 4275THRU-4295

PERFORATION DEPTH: 3575THRU-149 33-4 CHANAC 3300THRU-325 33-4 CHANAC 3872THRU-3890 33-4 CHANAC 4036THRU-3956 33-4 CHANAC 4073THRU-3988 33-4 CHANAC 4212THRU-4242 33-4 CHANAC 4268THRU-4298 33-4 CHANAC 4130THRU-4110 33-4 CHANAC 4255THRU-4265 33-4 CHANAC 4275THRU-4295

FEET: 3575THRU-149 33-4 CHANAC 3300THRU-325 33-4 CHANAC 3872THRU-3890 33-4 CHANAC 4036THRU-3956 33-4 CHANAC 4073THRU-3988 33-4 CHANAC 4212THRU-4242 33-4 CHANAC 4268THRU-4298 33-4 CHANAC 4130THRU-4110 33-4 CHANAC 4255THRU-4265 33-4 CHANAC 4275THRU-4295

ANALYSIS DATE: AUG-24-74 AUG-24-74 AUG-24-74

SPECIFIC CONDUCTANCE (UMHOS): 18170 6300 3000 534 7

TOTAL DISSOLVED SOLIDS (MG/L): 18170 6300 3000 534 7

CHLORIDE (MG/L): 18170 6300 3000 534 7

OIL AND GREASE (MG/L): 18170 6300 3000 534 7

SULFATE (MG/L): 18170 6300 3000 534 7

BENZENE (UG/L): 18170 6300 3000 534 7

TOLUENE (UG/L): 18170 6300 3000 534 7

ETHYLBENZENE (UG/L): 18170 6300 3000 534 7

STYRENE (UG/L): 18170 6300 3000 534 7

XYLENES (UG/L): 18170 6300 3000 534 7

NAPHTHALENE (UG/L): 18170 6300 3000 534 7

PHENOLS (UG/L): 18170 6300 3000 534 7

BENZOIC ACID (UG/L): 18170 6300 3000 534 7

UNO (): UNDETECTED (DETECTION LIMIT)

Parameter	Units	Detection Limit	Concentration		
			Ranch #67	Ranch #69	W-D-1
Specific Conductance	umhos	1	18,170	20,300	2,630
Total Dissolved Solids	mg/L	10	6,300	8,200	2,100
Chloride	mg/L	0.5	3,600	4,700	460
Oil and Grease	mg/L	5	534	19	26
Sulfate	mg/L	3	6.5	10	210

David New-Har

Santa Margarita
WD-1

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October 28, 1986

TEXACO

Total Metals Analysis and Other General Parameters

Sample ID:

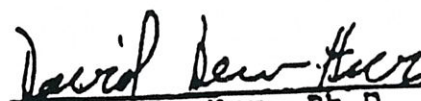
Lab No. 86-10-047-01

The sample, received on October 21, 1986, was analyzed for the various metals listed by the State of California as hazardous. The results are shown below:

<u>Element</u>	<u>Detection Limit, mg/L</u>	<u>Concentration mg/L</u>
Antimony	0.05	ND
Arsenic	0.002	ND
Barium	0.1	2.11
Beryllium	0.005	0.064
Cadmium	0.005	0.010
Chromium	0.01	ND
Cobalt	0.05	ND
Copper	0.02	33.
Lead	0.01	0.053
Mercury	0.0002	0.0075
Molybdenum	0.1	ND
Nickel	0.04	0.062
Selenium	0.002	ND
Silver	0.01	0.019
Thallium	0.01	0.025
Vanadium	0.025	0.134
Zinc	0.02	149.

Additional requested metallic parameters are listed below:

<u>Element</u>	<u>Detection Limit, mg/L</u>	<u>Concentration mg/L</u>
Boron	0.004	6.8
Calcium	1.	584
Magnesium	1.	26.1
Manganese	0.01	1.13
Potassium	1.	24.3
Sodium	1.	1,400
Strontium	0.08	11.9


David Ben-Hur, Ph.D.
Laboratory Technical Director

Physical Parameters

<u>Parameter</u>	<u>Units</u>	<u>Value</u>
Specific Conductance	umho	9,590
Specific Gravity	g/ml	1.008

General Parameters

<u>Parameter</u>	<u>Units</u>	<u>Value</u>
pH	--	10.90
Total dissolved solids	mg/L	5,630
Oil & Grease	mg/L	359
Total hardness	mg CaCO ₃ /L	1,600
Color	--	Clear, Colorless
Odor	--	70
Surfactants	mg/L	1.9

Anionic Parameters

<u>Parameter</u>	<u>Units</u>	<u>Detection Limit</u>	<u>Value</u>
Alkalinity			
hydroxide	mg CaCO ₃ /L	1	360
carbonate	mg CaCO ₃ /L	3	720
bicarbonate	mg CaCO ₃ /L	5	ND
Chloride	mg/L	10	2,900
Fluoride	mg/L	0.25	0.35
Total nitrogen	mg N/L	0.1	1.5
Nitrate	mg NO ₃ /L	0.1	2.7
Total Phosphorus	mg P/L	0.1	1.5
Sulfate	mg SO ₄ /L	3	72
Total phenols	mg/L	1	ND

David Ben-Hur
 David Ben-Hur, Ph.D.
 Laboratory Technical Director

Santa Margarita Formation
4875'-5075'Sample Number
Santa Margarita
WD-1Organics Analysis Data Sheet
(Page 1)

Lab No. 86-10-047-01

Laboratory Name: WESTON Case No: _____
 Lab Sample ID No: 86-10-047-01 QC Report No: _____
 Sample Matrix: Water Contract No: _____
 Data Release Authorized By: David Ben-Har Date Sample Received: 10/21/86

Volatile Compounds

Concentration: Low Medium (Circle One)

Date Extracted/Prepared: NADate Analyzed: 10/22/86Conc/Dil Factor: 1X & 10X pH _____Percent Moisture: (Not Decanted) NA

CAS Number		ug/l or ug/Kg (Circle One)
74-87-3	Chloromethane	10 U
74-83-9	Bromomethane	10 U
75-01-4	Vinyl Chloride	10 U
75-00-3	Chloroethane	4 J
75-09-2	Methylene Chloride	10 U
67-64-1	Acetone	10 U
75-15-0	Carbon Disulfide	5 U
75-35-4	1, 1-Dichloroethene	5 U
75-34-3	1, 1-Dichloroethane	5 U
156-60-5	Trans-1, 2-Dichloroethene	5 U
67-66-3	Chloroform	5 U
107-06-2	1, 2-Dichloroethane	5 U
78-93-3	2-Butanone	10 U
71-55-6	1, 1, 1-Trichloroethane	5 U
56-23-5	Carbon Tetrachloride	5 U
108-05-4	Vinyl Acetate	10 U
75-27-4	Bromodichloromethane	5 U

CAS Number		ug/l or ug/Kg (Circle One)
78-87-5	1, 2-Dichloropropane	4 J
10061-02-6	Trans-1, 3-Dichloropropane	5 U
79-01-6	Trichloroethene	5 U
124-48-1	Dibromochloromethane	5 U
79-00-5	1, 1, 2-Trichloroethane	5 U
71-43-2	Benzene	3,680
10061-01-5	cis-1, 3-Dichloropropane	5 U
110-75-8	2-Chloroethylvinylether	10 U
75-25-2	Bromoform	5 U
108-10-1	4-Methyl-2-Pentanone	5 U
591-78-6	2-Hexanone	10 U
127-18-4	Tetrachloroethene	5 U
79-34-5	1, 1, 2, 2-Tetrachloroethane	5 U
108-88-3	Toluene	1,700
108-90-7	Chlorobenzene	5 U
100-41-4	Ethylbenzene	490
100-42-5	Styrene	2,040
	Total Xylenes	203

Data Reporting Qualifiers

For reporting results to EPA, the following results qualifiers are used
 Additional flags or footnotes explaining results are encouraged. However, the
 definition of each flag must be explicit.

- Value** If the result is a value greater than or equal to the detection limit, report the value
- U** Indicates compound was analyzed for but not detected. Report the minimum detection limit for the sample with the U (e.g., 10U) based on necessary concentration/dilution action. (This is not necessarily the instrument detection limit.) The footnote should read: U-Compound was analyzed for but not detected. The number is the minimum attainable detection limit for the sample
- J** Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed or when the mass spectral data indicated the presence of a compound that meets the identification criteria but the result is less than the specified detection limit but greater than zero (e.g., 10U). If limit of detection is 10 ug/l and a
- C** This flag applies to pesticide parameters where the identification has been confirmed by GC/MS. Single component pesticides ≥ 10 ng/l in the final extract should be confirmed by GC/MS
- B** This flag is used when the analyte is found in the blank as well as sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action
- Other** Other specific flags and footnotes may be required to properly define the results. If used, they must be fully described and such description attached to the data summary report

Laboratory Name WESTON
Case No. _____

Santa Margarita
Formation 4875'-5075'

Page 4 of 4

Sample Number
Santa Margarita
WD-1

Organics Analysis Data Sheet
(Page 2)

Semivolatile Compounds

Concentration: Low Medium (Circle One)
Date Extracted / Prepared 10/23/86
Date Analyzed 10/25/86
Conc / Dil Factor: NA
Percent Moisture (Decanted) NA

GPC Cleanup ☐ Yes ☒ No
Separatory Funnel Extraction ☒ Yes
Continuous Liquid - Liquid Extraction ☐ Yes

CAS Number		ug / l or ug / Kg (Circle One)
108-95-2	Phenol	10
111-44-4	bis(2-Chloroethyl) Ether	10 U
95-57-8	2-Chlorophenol	10 U
541-73-1	1,3-Dichlorobenzene	10 U
106-46-7	1,4-Dichlorobenzene	10 U
100-51-6	Benzyl Alcohol	10 U
95-50-1	1,2-Dichlorobenzene	10 U
95-48-7	2-Methylphenol	6
39638-32-9	bis(2-chloroisopropyl) Ether	10 U
106-44-5	4-Methylphenol	10
621-64-7	N-Nitroso-Di-n-Propylamine	10
67-72-1	Hexachloroethane	10 U
98-95-3	Nitrobenzene	10 U
78-59-1	Isophorone	10 U
88-75-5	2-Nitrophenol	10 U
105-67-9	2,4-Dimethylphenol	6
85-85-0	Benzoic Acid	27
111-91-1	bis(2-Chloroethoxy)Methane	10 U
120-83-2	2,4-Dichlorophenol	10 U
120-82-1	1,2,4-Trichlorobenzene	10 U
91-20-3	Naphthalene	20
106-47-8	4-Chloroaniline	10 U
87-68-3	Hexachlorobutadiene	10 U
59-50-7	4-Chloro-3-Methylphenol	30
91-57-6	2-Methylnaphthalene	10 U
77-47-4	Hexachlorocyclopentadiene	10 U
88-06-2	2,4,6-Trichlorophenol	10 U
95-95-4	2,4,5-Trichlorophenol	50 U
91-58-7	2-Chloronaphthalene	10 U
88-74-4	2-Nitroaniline	10 U
131-11-3	Dimethyl Phthalate	10 U
208-96-8	Acenaphthylene	10 U
99-09-2	3-Nitroaniline	50 U

CAS Number		ug / l or ug / Kg (Circle One)
83-32-9	Acenaphthene	10 U
51-28-5	2,4-Dinitrophenol	50 U
100-02-7	4-Nitrophenol	50 U
132-64-9	Dibenzofuran	10 U
121-14-2	2,4-Dinitrotoluene	10 U
606-20-2	2,6-Dinitrotoluene	10 U
84-66-2	Diethylphthalate	10 U
7005-72-3	4-Chlorophenyl-phenylether	10 U
86-73-7	Fluorene	10 U
100-01-6	4-Nitroaniline	50 U
534-52-1	4,6-Dinitro-2-Methylphenol	50 U
86-30-6	N-Nitrosodiphenylamine (1)	10 U
101-55-3	4-Bromophenyl-phenylether	10 U
118-74-1	Hexachlorobenzene	10 U
97-86-5	Pentachlorophenol	50 U
85-01-8	Phenanthrene	20
120-12-7	Anthracene	10 U
84-74-2	Di-n-Butylphthalate	10
206-44-0	Fluoranthene	10 U
129-00-0	Pyrene	20
85-68-7	Butylbenzylphthalate	10
91-94-1	3,3'-Dichlorobenzidine	20 U
56-55-3	Benzofluoranthene	10 U
117-81-7	bis(2-Ethylhexyl)Phthalate	50
218-01-9	Chrysene	10 U
117-84-0	Di-n-Octyl Phthalate	10 U
205-99-2	Benzobifluoranthene	10 U
207-08-9	Benzofluoranthene	10 U
50-32-8	Benzofluoranthene	10 U
193-39-5	Indeno[1,2,3-cd]Pyrene	10 U
53-70-3	Dibenzofluoranthene	10 U
191-24-2	Benzofluoranthene	10 U

U = Not detected, the preceding number is the detection limit

(1) - Cannot be separated from diphenylamine

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4100 ATLAS CT., BAKERSFIELD, CALIFORNIA 93308 PHONE (805) 327-4911 FAX (805) 327-1918

TEXACO REFINING & MARKETING
P O BOX 1476
BAKERSFIELD, CA 93302
Attn.: JOE SELGRATH 326-4330

Date Reported: 12/04/91
Date Received: 11/14/91
Laboratory No.: 12299-1

Sample Description: INJECTION WELL WD-2 FORMATION FLUID, 11-14-91 SAMPLE COLLECTED BY
BARBI YADON

WATER ANALYSIS

Constituents	Results	Units	D.L.R.	Method
Calcium	450.	mg/L	0.1	SW-6010
Magnesium	66.	mg/L	0.01	SW-6010
Sodium	1620.	mg/L	0.1	SW-7770
Potassium	232.	mg/L	0.1	SW-7610
Total Cations	128.	meq/L	0.01	Calculated
Hydroxide	None Detected	mg/L	0.8	SM-403
Carbonate	None Detected	mg/L	2.6	SM-403
Bicarbonate	380.	mg/L	2.6	SM-403
Chloride	3080.	mg/L	1.8	SW-9251
Sulfate	1770.	mg/L	5.0	SW-9036
Nitrate as NO3	None Detected	mg/L	20.0	EPA-353.2
Fluoride	2.3	mg/L	0.05	EPA-340.2
Total Anions	130.	meq/L	0.01	Calculated
	7.7	pH Units	0.1	SW-9040
Electrical Conductivity @ 25 C	14000.	umhos/cm	1.	SW-9050
Total Dissolved Solids @ 180 C	7160.	mg/L	10.	EPA-160.1
Color		Color Units	** 1.0	EPA-110.2
Odor	> 200.	Odor Units	NA	EPA-140.1
Turbidity	19.0	NT Units	0.05	EPA-180.1
MBAS	27.0	mg/L	0.02	EPA-425.1
Hardness as CaCO3	1400.	mg/L	0.3	Calculated
Alkalinity as CaCO3	311.	mg/L	3.0	SM-403
Boron	5.0	mg/L	0.1	SW-6010
Total Aluminum	306.	µg/L	50.	SW-6010
Total Antimony	None Detected	µg/L	100.	SW-6010
Total Arsenic	19.1	µg/L	2.	SW-7060
Total Barium	788.	µg/L	100.	SW-6010
Total Beryllium	None Detected	µg/L	10.	SW-6010
Total Cadmium	None Detected	µg/L	5.	SW-6010
Total Chromium	None Detected	µg/L	10.	SW-6010
Total Copper	520.	µg/L	10.	SW-6010
Total Iron	8480.	µg/L	50.	SW-6010
Total Lead	275.	µg/L	5.	SW-7421
Total Lithium	410.	µg/L	10.	SW-7430
Total Manganese	358.	µg/L	10.	SW-6010
Total Mercury	None Detected	µg/L	* 0.4	EPA-245.1
Total Nickel	None Detected	µg/L	50.	SW-6010
Total Selenium	None Detected	µg/L	2.	SW-7740
Total Silver	None Detected	µg/L	10.	SW-6010
Total Thallium	None Detected	µg/L	1.	SW-7841

ENVIRONMENTAL

CHEMICAL ANALYSIS

PETROLEUM

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TEXACO REFINING & MARKETING
P O BOX 1476
BAKERSFIELD, CA 93302
Attn.: JOE SELGRATH 326-4330

Date Reported: 12/04/91
Date Received: 11/14/91
Laboratory No.: 12299-1

Sample Description: INJECTION WELL WD-2 FORMATION FLUID, 11-14-91 SAMPLE COLLECTED BY
BARBI YADON

WATER ANALYSIS

<u>Constituents</u>	<u>Results</u>	<u>Units</u>	<u>D.L.R.</u>	<u>Method</u>
Total Vanadium	58.	µg/L	50.	SW-6010
Total Zinc	62.	µg/L	10.	SW-6010
Phenols	8000.	µg/L	2.	EPA-420.2
Total Cyanide	0.52	mg/L	0.02	EPA-335.3
Total Petroleum Hydrocarbons	8.	mg/kg	1.0	EPA-418.1

D.L.R. = Detection Limit for Reporting purposes.

REFERENCES:

- EPA = "Methods for Chemical Analysis of Water and Wastes", EPA-600, 14-79-020.
SM = "Standard Methods for Examination of Water and Wastewater", 16th Edition 1986.
SW = "Test Methods for Evaluating Solid Wastes Physical/Chemical Methods",
SW 846, September, 1986.

* Raised detection limit due to sample interference.

** Sample color not comparable to standards.

M. Alvarez
Department Supervisor

ENVIRONMENTAL

CHEMICAL ANALYSIS

PETROLEUM

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Volatile Organic Analysis

TEXACO REFINING & MARKETING
 P O BOX 1476
 BAKERSFIELD, CA 93302
 Attn.: JOE SELGRATH 326-4330

Date of
 Report: 11/22/91
 Lab #: 12299-1

Sample Description: INJECTION WELL WD-2 FORMATION FLUID, 11-14-91 SAMPLE COLLECTED BY
 BARBI YADON

Test Method: EPA Method 8240

Sample Matrix: Waste Water

Date Sample
 Collected:
 11/14/91

Date Sample
 Received @ Lab:
 11/14/91

Date Analysis
 Completed:
 11/22/91

<u>Constituents</u>	<u>Analysis Results</u>	<u>Reporting Units</u>	<u>Minimum Reporting Level</u>
Benzene	600.	µg/L	500.
Bromodichloromethane	None Detected	µg/L	500.
Bromoform	None Detected	µg/L	500.
Bromomethane	None Detected	µg/L	500.
Carbon tetrachloride	None Detected	µg/L	500.
Chlorobenzene	None Detected	µg/L	500.
Chloroethane	None Detected	µg/L	500.
2-Chloroethylvinyl ether	None Detected	µg/L	5000.
Chloroform	None Detected	µg/L	500.
Chloromethane	None Detected	µg/L	500.
Dibromochloromethane	None Detected	µg/L	500.
1,2-Dichlorobenzene	None Detected	µg/L	500.
1,3-Dichlorobenzene	None Detected	µg/L	500.
1,4-Dichlorobenzene	None Detected	µg/L	500.
1,1-Dichloroethane	None Detected	µg/L	500.
1,2-Dichloroethane	None Detected	µg/L	500.
1,1-Dichloroethene	None Detected	µg/L	500.
trans-1,2-Dichloroethene	None Detected	µg/L	500.
1,2-Dichloropropane	None Detected	µg/L	500.
cis-1,3-Dichloropropene	None Detected	µg/L	500.
trans-1,3-Dichloropropene	None Detected	µg/L	500.
Ethyl benzene	3200.	µg/L	500.
Methylene Chloride	None Detected	µg/L	5000.
1,1,2,2-Tetrachloroethane	None Detected	µg/L	500.
Tetrachloroethene	None Detected	µg/L	500.
Toluene	500.	µg/L	500.
1,1,1-Trichloroethane	None Detected	µg/L	500.
1,1,2-Trichloroethane	None Detected	µg/L	500.
Trichloroethene	None Detected	µg/L	500.
Trichlorofluoromethane	None Detected	µg/L	500.

ENVIRONMENTAL

CHEMICAL ANALYSIS

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Volatile Organic Analysis
(8240)TEXACO REFINING & MARKETING
P O BOX 1476
BAKERSFIELD, CA 93302
Attn.: JOE SELGRATH 326-4330Date of
Report: 11/22/91
Lab #: 12299-1Sample Description: INJECTION WELL WD-2 FORMATION FLUID, 11-14-91 SAMPLE COLLECTED BY
BARBI YADON

<u>Constituents</u>	<u>Analysis Results</u>	<u>Reporting Units</u>	<u>Minimum Reporting Level</u>
1,1,2-Trichloro-			
1,2,2-trifluoroethane	None Detected	µg/L	500.
Vinyl Chloride	None Detected	µg/L	500.
m & p-Xylene	18000.	µg/L	500.
o-Xylene	4600.	µg/L	500.
Methylcyclohexane	None Detected	ug/L	500.

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Department Supervisor



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Base Neutral and Acid Extractables Organic Analysis

TEXACO REFINING & MARKETING
P O BOX 1476
BAKERSFIELD, CA 93302
Attn.: JOE SELGRATH 326-4330

Date of
Report: 11/21/91
Lab #: 12299-1

Sample Description: INJECTION WELL WD-2 FORMATION FLUID, 11-14-91 SAMPLE COLLECTED BY
BARBI YADON

Test Method: EPA Method 8270

Sample Matrix: Waste Water

Date Sample
Collected:
11/14/91

Date Sample
Received @ Lab:
11/14/91

Date Analysis
Completed:
11/21/91

<u>Constituents</u>	<u>Analysis Results</u>	<u>Reporting Units</u>	<u>Minimum Reporting Level</u>
Acenaphthene	None Detected	µg/L	10.
Acenaphthylene	None Detected	µg/L	10.
Aldrin	None Detected	µg/L	10.
Aniline	260.	µg/L	10.
Anthracene	None Detected	µg/L	10.
Benzo (a) anthracene	None Detected	µg/L	10.
Benzo (b) fluoranthene	None Detected	µg/L	10.
Benzo (k) fluoranthene	None Detected	µg/L	10.
Benzo (a) pyrene	None Detected	µg/L	10.
Benzo (ghi) perylene	None Detected	µg/L	10.
Benzoic Acid	None Detected	µg/L	10.
Benzyl Alcohol	None Detected	µg/L	10.
Butyl Benzyl phthalate	None Detected	µg/L	10.
alpha-BHC	None Detected	µg/L	10.
beta-BHC	None Detected	µg/L	10.
delta-BHC	None Detected	µg/L	10.
gamma-BHC	None Detected	µg/L	10.
bis(2-chloroethyl)ether	None Detected	µg/L	10.
bis(2-chloroethoxy)methane	None Detected	µg/L	10.
bis(2-ethylhexyl)phthalate	13.	µg/L	10.
bis(2-chloroisopropyl)ether	None Detected	µg/L	10.
4-Bromophenyl phenyl ether	None Detected	µg/L	10.
4-Chloroaniline	None Detected	µg/L	10.
2-Chloronaphthalene	None Detected	µg/L	10.
4-Chlorophenyl phenyl ether	None Detected	µg/L	10.
Crysene	None Detected	µg/L	10.
4,4-DDD'	None Detected	µg/L	10.
4,4-DDE'	None Detected	µg/L	10.
4,4-DDT'	None Detected	µg/L	10.
Dibenzo (a,h) anthracene	None Detected	µg/L	10.
Dibenzofuran	None Detected	µg/L	10.

Base Neutrals and Acids (Continued)

Page 2

TEXACO REFINING & MARKETING
P O BOX 1476
BAKERSFIELD, CA 93302
Attn.: JOE SELGRATH 326-4330

Date of
Report: 11/21/91
Lab #: 12299-1

Sample Description: INJECTION WELL WD-2 FORMATION FLUID, 11-14-91 SAMPLE COLLECTED BY
BARBI YADON

<u>Constituents</u>	<u>Analysis Results</u>	<u>Reporting Units</u>	<u>Minimum Reporting Level</u>
Di-n-butyl phthalate	None Detected	µg/L	10.
1,3-Dichlorobenzene	None Detected	µg/L	10.
1,2-Dichlorobenzene	None Detected	µg/L	10.
1,4-Dichlorobenzene	None Detected	µg/L	10.
3,3-Dichlorobenzidine	None Detected	µg/L	10.
Dieldrin	None Detected	µg/L	10.
Diethyl phthalate	None Detected	µg/L	10.
Dimethyl phthalate	None Detected	µg/L	10.
2,4-Dinitrotoluene	None Detected	µg/L	10.
2,6-Dinitrotoluene	None Detected	µg/L	10.
Di-n-octylphthalate	None Detected	µg/L	10.
1,2-Diphenylhydrazine	None Detected	µg/L	10.
Endosulfan sulfate	None Detected	µg/L	10.
Endrin aldehyde	None Detected	µg/L	10.
Fluoranthene	None Detected	µg/L	10.
Fluorene	None Detected	µg/L	10.
Heptachlor	None Detected	µg/L	10.
Heptachlor epoxide	None Detected	µg/L	10.
Hexachlorobenzene	None Detected	µg/L	10.
Hexachlorobutadiene	None Detected	µg/L	10.
Hexachloroethane	None Detected	µg/L	10.
Ideno (1,2,3-cd) pyrene	None Detected	µg/L	10.
Isophorone	None Detected	µg/L	10.
2-Methylnaphthalene	100.	µg/L	10.
Naphthalene	90.	µg/L	10.
2-Nitroaniline	None Detected	µg/L	10.
3-Nitroaniline	None Detected	µg/L	10.
4-Nitroaniline	None Detected	µg/L	10.
Nitrobenzene	None Detected	µg/L	10.
N-Nitrosodi-n-propylamine	None Detected	µg/L	10.
Phenanthrene	None Detected	µg/L	10.
Pyrene	None Detected	µg/L	10.
1,2,4-Trichlorobenzene	None Detected	µg/L	10.
4-Chloro-3-methylphenol	None Detected	µg/L	10.
2-Chlorophenol	None Detected	µg/L	10.
2,4-Dichlorophenol	None Detected	µg/L	10.
2,4-Dimethylphenol	560.	µg/L	10.
2,4-Dinitrophenol	None Detected	µg/L	10.
2-Methyl-4,6-dinitrophenol	None Detected	µg/L	10.

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Base Neutrals and Acids (Continued)

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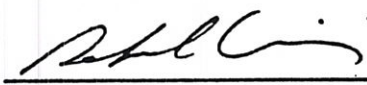
TEXACO REFINING & MARKETING
 P O BOX 1476
 BAKERSFIELD, CA 93302
 Attn.: JOE SELGRATH 326-4330

Date of
 Report: 11/21/91
 Lab #: 12299-1

Sample Description: INJECTION WELL WD-2 FORMATION FLUID, 11-14-91 SAMPLE COLLECTED BY
 BARBI YADON

<u>Constituents</u>	<u>Analysis Results</u>	<u>Reporting Units</u>	<u>Minimum Reporting Level</u>
2-Methylphenol	950.	µg/L	10.
4-Methylphenol	1200.	µg/L	10.
2-Nitrophenol	None Detected	µg/L	10.
4-Nitrophenol	None Detected	µg/L	10.
Pentachlorophenol	None Detected	µg/L	10.
Phenol	1200.	µg/L	10.
2,4,5-Trichlorophenol	None Detected	µg/L	10.
2,4,6-Trichlorophenol	None Detected	µg/L	10.
Benzidene	None Detected	µg/L	10.
Endosulfan I	None Detected	µg/L	10.
Endosulfan II	None Detected	µg/L	10.
Endrin	None Detected	µg/L	10.
Hexachlorocyclopentadiene	None Detected	µg/L	10.
2-Naphthylamine	None Detected	µg/L	10.
N-Nitrosodimethylamine	None Detected	µg/L	10.
N-Nitrosodiphenylamine	None Detected	µg/L	10.

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 Department Supervisor